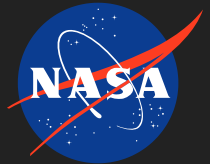


Monitoring Electron Beam Freeform Fabrication by Active Machine Vision, Phase I

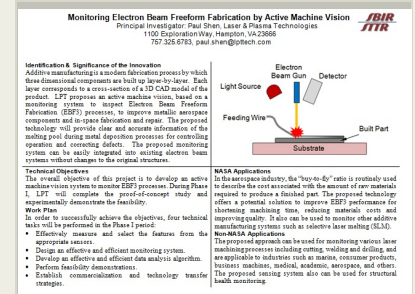
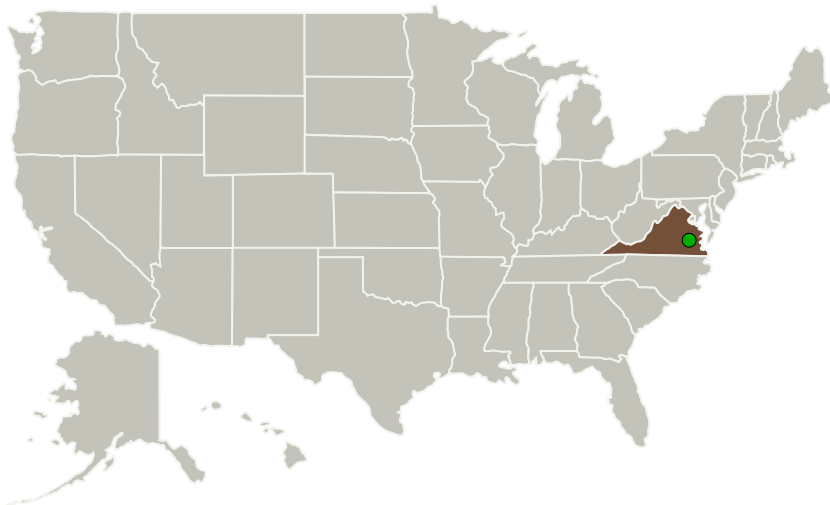
Completed Technology Project (2014 - 2014)



Project Introduction

Additive manufacturing is a modern fabrication process by which three dimensional components are built up layer-by-layer. Each layer corresponds to a cross-section of a 3D CAD model of the product. LPT proposes an active machine vision, based on a monitoring system to improve Electron Beam Freeform Fabrication (EBF3) processes, by measuring spatial, spectral, thermal and temporal information of the melt pool and element compositions of materials. The proposed technology will provide clear and accurate information of the melting pool during the metal deposition processes in order to control operation and correct defects. LPT has extensive expertise in monitoring laser machining processes using various optical sensing technologies. These sensing technologies have shown significant promise for developing a sensing system to monitor EBF3 processes. During Phase I, LPT will complete the theoretical design of the active machine vision system. The proof-of-concept tests will be performed in lab conditions to demonstrate the feasibility of the proposed approach. The research and development efforts in Phase I will provide a solid base for implementing a prototype during Phase II and commercializing this technology during Phase III.

Primary U.S. Work Locations and Key Partners



Monitoring Electron Beam Freeform Fabrication by Active Machine Vision Project Image

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Monitoring Electron Beam Freeform Fabrication by Active Machine Vision, Phase I

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Organizations Performing Work	Role	Type	Location
Laser & Plasma Technologies, LLC	Lead Organization	Industry	Hampton, Virginia
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Virginia

Project Transitions



June 2014: Project Start

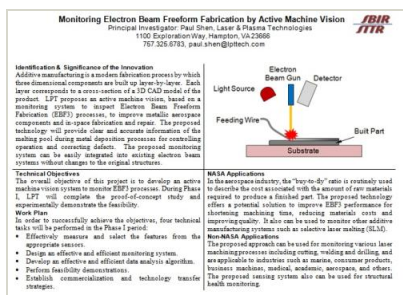


December 2014: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137518>)

Images



Project Image

Monitoring Electron Beam Freeform Fabrication by Active Machine Vision Project Image
(<https://techport.nasa.gov/image/131884>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Laser & Plasma Technologies, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

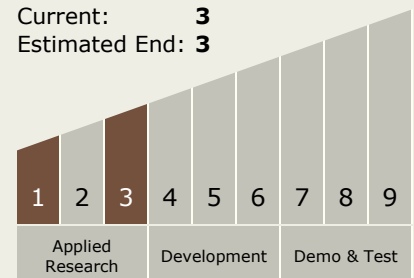
Carlos Torrez

Principal Investigator:

Guoqing (paul) Shen

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Monitoring Electron Beam Freeform Fabrication by Active Machine Vision, Phase I

Completed Technology Project (2014 - 2014)



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.4 Manufacturing
 - └ TX12.4.1 Manufacturing Processes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System